UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/275,578	03/24/99	SHINOHARA M	2803.62981

IM22/1103

PATRICK G BURNS
GREER BURNS & CRAIN
SUITE 8660 - SEARS TOWER
233 SOUTH WACKER DRIVE
CHICAGO IL 60606

EXAMINER	
ART UNIT	PAPER NUMBER
1773	6

DATE MAILED: 11/03/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary	Application No. 09/275,578	Applicant(s) SHINOHARA ET AL.	
	Examiner Kevin M Bernatz	Art Unit 1773	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) 13-15 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☒ Claim(s) 4-6 is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☒ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☒ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of claims 1 - 12 in Paper No. 5 is acknowledged. The traversal is on the ground(s) that the groups are not related as product and process of using and that searching claims 13 – 15 would not represent an undo burden to the examiner. This is not found persuasive because the examiner has met the requirements for undo burden and the inventions are deemed to be related as product and process of using.

The examiner has shown the inventions would require a separate field of search as defined in MPEP § 808.02 and has therefor met the requirement showing undo burden (see MPEP § 803).

Claims 1 – 12 are drawn to a magnetic recording medium while the invention of claims 13 – 15 are drawn to a magnetic recording disk device with a magnetoresistive head (line 27 of claim 13). The recording medium of claims 1 – 12 could be used with a reproducing head other than a magnetoresistive head, such as a magnetoptical head. It should also be noted that claims 13 – 15 are drawn to a magnetic disk device while claims 1 – 12 do not presently claim a magnetic disk.

The requirement is still deemed proper and is therefore made FINAL.

Specification

2. The disclosure is objected to because of informalities such as: "...and NiP layer..." should be "...and a NiP layer..." on page 3, line 35, and "...called as a film..." should be "...called a film..." on page 5, line 37, etc. The applicant is requested to review the application thoroughly and make all appropriate corrections.

3. The disclosure is objected to because of the following informalities: the NiP ratios as listed are unclear. Appropriate correction is required.

Claim Objections

4. Claim 4 is objected to because of the following informalities: on lines 3 and 4, the applicant claims a range for the NiP atom%. The range is not written clearly. For purposes of examination, the claim was interpreted to mean the concentration of P in the NiP layer was between 15 and 33 atom%.

5. Claim 5 is objected to because of the following informalities: on line 9, the claim reads "x is a in the ..." and should be "x is in the ...". Appropriate correction is required.

6. Claim 6 is objected to because of the following informalities: on line 9, the claim reads "a sum of x and y ..." and should read "the sum of x and y ...". Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as not being enabling because the claim(s) omit(s) matter disclosed to be essential to the invention as described in the specification or in other statements of record. *In re Mayhew, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).* See also MPEP § 2164.08(c).

The thickness of the NiP layer and atom% of phosphorous in the NiP layer are critical or essential to the practice of the invention, but not included in the claim(s). On page 17, lines 17-23 applicant discloses that if the thickness of the NiP layer is < 5 nm,

insufficient magnetic characteristics are achieved. On page 17, lines 30 – 35 applicant discloses that if the atom% P in the NiP layer is < 15%, the NiP exhibits magnetic property that can cause problems in the magnetic recording. On page 18, lines 9 – 16 the applicant discloses that if the atom% P in the NiP layer is >33%, the layer becomes brittle and cannot be formed with high purity. Appropriate correction is required.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1 – 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 1 recites the limitation "[a] magnetic recording medium" which includes the added limitation of a "circumferential direction of easy magnetization". The medium must be in the form of a disk inorder to possess a circumferential direction.

12. Claims 5 and 6 recite the limitation "a balance amount" in line 8. It is unclear what applicant means by "balance amount" since the numbers are not explicitly stated to be atom percents. For examination purposes, the balance amount was taken to be 100 minus the sum of the atom% of the other elements.

13. Claim 9 recites the limitation "thickness of the first underlayer is in the range of 5 to 25 nm" in line 3. There is insufficient antecedent basis for this limitation in the claim since the first underlayer is disclosed as optional in claim 1. This rejection can be overcome by adding ",when included," after "...thickness of the first underlayer".

14. The term "thin" in claims 10 and 11 is a relative term which renders the claim indefinite. The term "thin" is not defined by the claim and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 1 – 2, 5 – 8, and 10 – 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tani et al. (U.S. Patent No. 5,250,339) in view of Okuyama et al. (U.S. Patent No. 6,071,607).

Regarding claim 1, Tani et al. discloses a magnetic recording medium comprising a nonmagnetic glass substrate having non-oriented irregularities and having an underlayer comprising a second underlayer of nickel and phosphorous and a third underlayer containing chromium as the principal component, formed in the described order in the absence of a first underlayer on the glass substrate (col. 3, line 50 to col. 4, line 23). Since no texturing is performed on the glass substrate disclosed by Tani et al. (hereafter referred to as Tani), the roughness reported by Tani is deemed to be due to non-oriented irregularities. Tani further discloses a magnetic recording layer which has a circumferential direction of easy magnetization (col. 3, lines 9 – 15).

Tani fails to disclose a magnetic layer containing cobalt as the principal component along with chromium and platinum in combination with tantalum or tantalum and niobium.

However, Okuyama et al. teaches that a CoCrPtTa film is advantageous for use in a magnetic recording medium. Okuyama et al. discloses that the CoCrTaPt-base alloy has "a combination of low noise derived from CoCrTa-base alloy with high coercive force derived from CoCrPt-base alloy[s]" (col. 1, lines 60 – 64).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tani to include the CoCrPtTa alloy as taught by Okuyama et al. to produce a recording medium with both low noise and high coercive force.

Regarding claim 2, Tani discloses that the NiP underlayer possesses circumferentially distributed stripe-like ridges (col. 2, lines 27 – 30).

Regarding claim 5, Okuyama et al. discloses a CoCrPtTa composition that encompasses the limits claimed by applicant (col. 6, lines 63 – 67) and cites a specific example of a $Co_{77}Cr_{15}Pt_4Ta_4$ alloy in example 3 (col. 19, lines 33 – 35).

Regarding claims 6 and 7, Okuyama et al. discloses a $Co_{74}Cr_{17}Pt_5Ta_2Nb_2$ alloy in example 6 (col. 22, lines 1 – 5).

Regarding claim 8, Okuyama et al. discloses that tBr must be ≤ 120 G μm (col. 9, line 66 to col. 10, line 7) and discloses in example 3 a film with a tBr of 100 G μm (col. 19, lines 44 – 45).

Regarding claims 10 and 11, these claims are product by process claims. The additional limitations claimed in claims 10 and 11 are given no patentable weight and therefor fail to further limit the parent claim (claim 1). "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113.

Regarding claim 12, Tani discloses a protective layer consisting of carbon applied over the magnetic layer (col. 4, lines 18 – 20).

17. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tani (339) and Okuyama et al. (607) as applied to claim 1 above, and further in view of Yamamoto (U.S. Patent 5,863,609).

Tani and Okuyama et al. disclose the claimed invention as described above.

Tani and Okuyama et al. fail to disclose the specific atomic percent of the NiP subbing layer.

However, Yamamoto teaches that using a 75% Ni/25% P composition when applying a NiP layer to recording media is old in the art. Yamamoto further teaches that this composition is beneficial because it is amorphous, has high mechanical strength, is anti-corrosive and is also non-magnetic (col. 2, lines 51 – 57).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tani and Okuyama et al. to use a 75% Ni, 25% P underlayer as taught by Yamamoto inorder to produce a non-magnetic underlayer with high mechanical strength and high corrosion resistance.

18. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tani et al. (339) in view of Chang et al. (U.S. Patent No. 5,879,783).

Regarding claim 1, Tani discloses a magnetic recording medium comprising a nonmagnetic glass substrate having non-oriented irregularities and having an underlayer comprising a second underlayer of nickel and phosphorous and a third underlayer containing chromium as the principal component, formed in the described order in the absence of a first underlayer on the glass substrate (col. 3, line 50 to col. 4, line 23). Since no texturing is performed on the glass substrate disclosed by, the roughness reported by Tani is deemed to be due to non-oriented irregularities. Tani further discloses a magnetic recording layer which has a circumferential direction of easy magnetization (col. 3, lines 9 – 15).

With regard to claim 1, Tani fails to disclose a magnetic layer containing cobalt as the principal component along with chromium and platinum in combination with tantalum or tantalum and niobium.

With regard to claim 3, Tani fails to disclose a surface roughness measured in both the circumferential direction and in the radial direction.

However, Chang et al. teaches that conventional magnetic recording media use CoCrPtTa magnetic layers (col. 2, lines 46 – 47) and that the surface roughness of the

seed layer has a peak-to-peak amplitude of as low as 0.5 nm. (col. 3, lines 60 – 65). The advantage of the CoCrPtTa layer has been described above. The advantage of roughening the substrate to exhibit peak-to-peak amplitudes in the range disclosed by Chang et al. is to provide a **(200)** crystallographic orientation which, in turn, induces a bicrystal cluster microstructure in the magnetic alloy layer. This bicrystal structure produces a high coercivity, low noise and high remnant squareness (col. 2, line 59 to col. 3, line 3). It is deemed that the substrate disclosed by Chang et al. would possess surface roughness characteristics identical to that disclosed by the applicant since it is old in the art to minimize the surface roughness for crystal growth.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tani (339) to include the surface roughness of the NiP substrate as taught by Chang et al. to produce a bicrystal cluster microstructure leading to a magnetic medium possessing high coercivity, low noise, and high remnant squareness.

19. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tani (339) and Chang et al. (783) as applied to claim 1 above, and further in view of Ross (U.S. Patent No. 5,871,621).

Tani and Chang et al. disclose the limitations of base claim 1 as described above. Chang et al. further discloses a preferred thickness of 50 nm for the NiP second underlayer and 55 nm for the chromium based third underlayer (col. 2, lines 38 – 46).

Tani and Chang et al. fail to disclose the thickness of the chromium based adhesive layer.

However, Ross discloses that thin chromium based adhesive layers enhance the adhesion of the NiP underlayer to the glass substrate (col. 3, lines 6 – 11). Ross further discloses that this layer is preferably 2 – 20 nm in thickness (col. 5, lines 8 – 12).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tani and Chang et al. to include a chromium adhesion layer of 2 – 20 nm thickness as taught by Ross inorder to promote the adhesion between the NiP underlayer and the glass substrate..

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-6078 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

KMB

KMB
October 27, 2000

STEVAN A. RESAN
PRIMARY EXAMINER